

METHODOLOGICAL NEWS

**A QUARTERLY INFORMATION BULLETIN FROM THE METHODOLOGY
AND DATA MANAGEMENT DIVISION**

March 2008

Boosting Analytical Capability in MDMD and the ABS

Welcome to the first edition of the Methodological News for the 2008 calendar year. We are looking forward to an interesting and productive year for MDMD, and an opportunity to realise some of the synergies which were created last year by the integration of the Data Management and Classifications branch, and the National Statistical Service Leadership Branch into the division.

The primary role of MDMD is to provide high quality, specialist services to the ABS, with the goal of ensuring that the methods and standards underlying ABS outputs are based on sound, defensible statistical principles and are cost effective. One of the areas of focus for MDMD 2008 is in boosting the analytical capability of MDMD and of the ABS more broadly.

The Analytical Services Branch (ASB) develops and disseminates new analytical methods and products, and produces a series of research papers which present the results of current research or analysis to encourage discussion and comment. Recently, the Time Series Analysis section (TSA) and the Data Access and Confidentiality Management Unit (DACMU) within MDMD were transferred into ASB as a way to bring together those sections undertaking complex or innovative analytical work. TSA, which plays a key role in the ABS around the production of seasonally adjusted series and training of internal clients, also has a research and development program which brings substantial opportunities for linkages within ASB. DACMU, whose roles include developing and advising on confidentialisation methodologies, and promoting quality, undertakes innovative research into the application of sound statistical analysis to support data confidentiality and confidentialised unit record file (CURF) management.

In addition to the internal restructuring of ASB within MDMD, the broader ABS restructure in 2007 created some key opportunities to boost analytical capability in the ABS. In July 2007, two new analysis branches were created: the Economic Analysis and Reporting Branch (in the Macroeconomics and Integration Group) and the Analysis and Special Projects Branch (in the Social Statistics Group). A strong collaboration between ASB and the two new analysis branches has been established, and the three branches are aiming to collectively enhance the analytical work undertaken by the ABS. The three branches are also working to create an Analytical Community within the ABS, comprised of

all ABS sections or areas undertaking analysis, as a means to disseminate analytical expertise and skills across the ABS more generally.

The integration of TSA and DACMU into ASB, and the strong linkages between ASB and the two new analysis branches in the ABS, have created significant opportunities for MDMD to focus on further enhancing quality of service provision and methodological rigour to support the work of the ABS.

For more information about the new structure of ASB, please contact Jill Charker on (02) 6252 7290.

Temporal Aggregation and Seasonal Adjustment

Due to user demand, the Australian Bureau of Statistics (ABS), in some instances, publishes original, seasonally adjusted and trend estimates at different observation frequencies for the same indicator. Hence sometimes at the quarterly level, original time series estimates are simply a temporal aggregate of their monthly counterpart. Suppose a time series of quarterly seasonally adjusted estimates is desired from such an equivalent time series pair. These estimates can be obtained via two approaches. Either by (1) seasonally adjusting the quarterly original time series directly, or by (2) seasonally adjusting the monthly original time series and then temporally aggregating to the quarterly level (referred to as the temporal aggregation approach hereafter). The ABS currently uses method 1 for seasonally adjusting equivalent time series pairs. This leads to quality and consistency issues along with duplicate work.

The ABS knows from previous research that estimating calendar-related effects (e.g. trading day effects) is more accurate when performed at the monthly level and then applied to the quarterly case. This idea of using a monthly time series to estimate a component of its quarterly equivalent is taken further by the temporal aggregation approach. The aim becomes to completely derive the quarterly seasonally adjusted series from its monthly seasonally adjusted counterpart. Hence significant improvements in quality and consistency are expected to be made.

For the Census X11 method, the literature suggests that seasonal adjustment first and temporal aggregation second is the more efficient approach in terms of mean squared error and forecast performance. However, the impact of temporal aggregation on current end revisions

has not been assessed for the mixed X11/ARIMA forecasting method utilised by the ABS.

The ABS is about to undertake case studies to compare the quarterly seasonally adjusted estimates obtained via the two approaches using the ABS X11/ARIMA forecasting method, in terms of their relative efficiency, revisability and consistency. The aim of this work is to confirm that the temporal aggregation approach is more efficient, results in no worsening of current end revisions and improves consistency. The background and methodological basis of these studies will be presented in an ABS Methodological Advisory Committee paper in June 2008.

For more information on this project, please contact Lisa Apted on (03) 6222 5932 or Mark Zhang on (02) 6252 5132.

Development of a Suitability Framework for Selecting Modes of Data Collection for ABS Surveys

The Data Collection Methodology (DCM) section in the Statistical Services Branch (SSB) performs a number of tasks for the Multi-Modal Data Collection (MMDC) project. A key DCM task for MMDC is to produce standards for the design and testing of new methods of data collection, before any substantial development work is conducted.

Final design standards for Computer Assisted Telephone Interviewing (CATI) and Excel forms have been in use for several years. Standards for Interactive Voice Response (IVR) systems were released in 2007, ready for when this method of data collection is piloted in the future. Survey Email Standards were released in early 2008 and work on standards for web surveys will begin later in 2008.

The next DCM task for the MMDC project is the development of guidelines for the relative suitability of data collection modes for different types of ABS surveys. A general document summarising the advantages and disadvantages of different modes of data collection is currently being drafted, with the modes broadly grouped into face-to-face, telephone, and self-administered modes. Separate suitability models will be produced for the data collection modes that are currently in use in the ABS or are expected to be used in the future. These models will provide a guide to the appropriateness of the modes of data collection and the selection of particular surveys for the pilot tests of these methods when they are introduced. The main framework document will be a new chapter in the Forms Design Standards Manual, with the suitability models appearing as sub-chapters.

For example, one of the ten factors in the existing CATI suitability model used to determine a survey's suitability for migration to CATI, is the number of data items that the survey has. This factor is scored as follows (lower scores indicate higher suitability):

Factor - Number of data items

Score	CATI
1	5 or fewer
2	6-10
3	11-20
4	21-40
5	41 and greater

A survey that has only one collected data item (e.g. the Retail Business Survey) will have a score of 1 for this factor, indicating a high level of suitability against this factor. Scores are obtained for this and nine other factors for the CATI model, with the overall score ranging from 10 to 50 points. The lower the score, the greater the suitability of the survey for migration to CATI.

Another factor in the CATI model is the amount of time the survey takes to administer. This factor has also been included in the draft IVR model; however, the scoring for time taken is even more stringent for IVR than for CATI (see below). This scoring reflects the fact that while CATI is most suitable for short surveys, IVR requires the survey to be even shorter.

Factor - Time taken/interview length (minutes)

Score	CATI	IVR
1	5 or fewer	3 or fewer
2	6-10	4-5
3	11-20	6-10
4	21-30	11-15
5	31 or more	16 or more

For further information, please contact Chloe Groves on (02) 6252 7649.

Exploring Methodologies to Extend Census Content

The population Census provides a unique opportunity to obtain detailed information from the whole population of Australia in a way that supports tabulation for small geographic areas and fine classificatory items. Unfortunately, space on the Census form is at a premium, and whenever new questions are added, a similar number need to be dropped to limit costs and avoid undue respondent burden.

An intriguing idea to extend the content of the Census is to use multiple "thematic" forms. These would each contain the same "core" questions making up the bulk of the Census, but would include a different set of "theme" questions. This would provide a complete Census of core items, and a very large survey of each theme item.

The South Australian Methodology Unit has conducted an exploration of methods for producing good estimates from the survey component of a thematic forms Census. It examined a situation with three different thematic forms, with each type delivered to approximately every third dwelling. This provides a one-in-three sample for each theme question, which should be enough to provide good estimates for quite small geographic areas and sub-populations.

The study looked at properties of estimates under various approaches. A weighting approach has the disadvantage of providing different survey weights for each theme, and would not reproduce Census totals by the core items. In contrast, an imputation approach would fill in theme values for persons not reporting for that theme, giving consistency of all counts. Unfortunately the standard "hot-deck" approach to imputation would bias the numbers reported for a category, because two-thirds of the theme values were imputed based on assumptions that did not take account of peculiarities of the category concerned. Thus, for example, Greek-born people may have theme values imputed from non-Greek-born people, which will mask any effects peculiar to Greek-born people.

To overcome these limitations, the study developed a "balanced imputation" approach, in which the imputes are chosen to give good agreement with the best available estimates, across a very large set of Census tables at a range of geographic levels right down to CD level. This method requires huge computation, but provides an imputed Census file with very satisfactory properties.

While thematic forms are not under consideration for the 2011 Census, this study opens up the possibility of moving in this direction in the future. The approach promises good small domain estimates for an increased set of questions, while retaining a complete Census of the majority of the current questions. A research paper will be published shortly on the ABS Website. For further information, please contact Philip Bell on (08) 82377304.

Investigating the Cube Sampling Method for Household Surveys

The use of information in the efficient design of surveys has been studied extensively. Well known methods include stratification and probability proportional-to-size sampling. These methods are designed to select efficient samples when there is only one survey characteristic of interest. More recently Deville and Tille (2004) developed the cube sampling method with the potential to select efficient samples when there are multiple characteristics of interest. Specifically, the cube method selects a balanced sample on a set of design variables. A balanced design has the property that the Horvitz–Thompson estimates of total for the set of design variables equal their known totals. If the design variables are well correlated with the survey characteristics of interest then a balanced sample will be efficient (i.e. less cost for the same level of standard error on the survey estimates).

The Household Survey Methodology section recently undertook a preliminary study to measure the reduction in standard errors of using the cube method for the selection of ABS household surveys. ABS household surveys are area samples, typically with Census Collection District (CD) as the Primary Sampling Unit (PSU). The study measured the impact on the standard error of balancing the sample of CDs on a set of CD-level design variables, obtained from the Census. The preliminary results of the study suggest that cube

sampling has the potential to provide significant cost savings, particularly for the Labour Force Survey.

With the availability of meshblocks, which is a much smaller geographic unit than the CD, future ABS household surveys may use this as the PSU. The study found that selecting a balanced sample of meshblocks, rather than of CDs, would provide further cost savings.

In future, the study will consider the complexity of maintaining a balanced sample over time while allowing for sample rotation, as well as operational and implementation issues.

For more information contact James Chipperfield on (02) 6252 7301.

The Use of Trials to Assess Changes in Operational Procedures in ABS Business Surveys

The Operations Research Unit has run three trials relating to the operational procedures behind Intensive Follow-Up (IFU). These were run on the Quarterly Economy Wide Survey (QEWS) and the Economic Activity Survey (EAS) during 2007. All trials involved the changing of the timing of the IFU procedures and were based on research looking at the length of time taken for forms to be returned.

For QEWS, the first trial (A) involved removing units from IFU until AFTER the second reminder. The units were chosen if they returned their form in the previous cycle by the second reminder, and received no outbound telephone contact.

Trial A has been run for five quarters now and each time the response rate for the trial A providers is around 98%. The number of providers in this group is usually around 7,000, meaning that no phone contact is required for those 7,000 providers. The success of this trial has resulted in the process being automated and hopefully will be implemented in a number of sub-annual collections during 2008.

The second trial (B) involved the change in the timing and staff allocation for a sample of providers. The changes in timing were as follows:

- wait five days after the first reminder before commencing phone IFU (instead of one day);
- wait five days after the second reminder before recommencing phone IFU; and
- wait three days after leaving an answering machine message.

Trial B was run in the September quarter 2007. A sample of 1000 providers was chosen and compared with providers not in the trial that were of the same scope.

Ideally, all providers would be contacted during the window of opportunity, however, resources do not permit this to happen. The main recommendations from the trial were therefore to prioritise providers in IFU

such that new units, previous non-respondents or late respondents are targeted in the first five days; and to use priorities to ensure that all providers are called before the second reminder rather than some getting called multiple times and others not at all. More work is needed to advise exactly how to proceed with this prioritisation and it is expected that it can also be applied to other collections.

The trial for EAS involved a sample of 3000 with the following changes in timing:

- delay commencement of phone IFU for ten days after the first and second reminders, or until ten days after the second reminder if there has been an inbound call;
- delay all phone contact for a minimum of five days and a maximum of 14 days after previous direct contact, whether inbound or outbound; and
- wait three days after leaving an answering machine message.

The EAS trial was run for the 06/07 cycle. Only preliminary results are available at the moment, however the results are generally similar to those for QEWS. For example, form receipt rate for those in the trial was slightly higher (90% compared to 86%), and trial providers had higher average outbound calls (1.8 compared to 1.3). In the case of EAS, the main recommendation from the trial was to move the timing of the entire EAS such that the optimal time to contact EAS providers does not overlap with any other surveys.

The overall outcome from these trials is that trial A is being implemented as general practice. The other two trials require further work to see how they will work in practice.

For further information, please contact Louise Gates on (02) 6252 6540.

Changing the Methodology for Measuring the Impact of Introducing a New Industry Classification for Sub-annual Surveys

An update in the Australian and New Zealand Standard Industry Classification (ANZSIC) from the 1993 version to the 2006 revision is likely to cause a statistically-induced change to the level and seasonal pattern of estimates for a number of ABS sub-annual business and labour employer surveys. These impacts would occur for sub-annual surveys in the September quarter of 2009, when samples designed on an ANZSIC06 basis are introduced. In order to be able to produce relevant statistics and a consistent series, it is important to be able to explicitly measure the impact of the change, then account for (backcast) this impact in a revised series such that users' interpretation of the statistics is unaffected.

Changes in circumstances have caused the strategy to measure the impact of the ANZSIC update to be revised. The original generic strategy to measure these

impacts for sub-annual business and labour employer surveys involved parallel estimation. This meant producing estimates on both ANZSIC93 and ANZSIC06 bases over a five-quarter period from June quarter 2008 to June quarter 2009 inclusive, using existing samples designed for ANZSIC93 outputs but topped up where necessary to produce more reliable estimates based on ANZSIC06. A parallel estimation strategy was chosen as it is a relatively cost-effective way of measuring impacts on both the levels of a series and the seasonality of estimates.

A number of other changes planned for 2009 have necessitated rethinking the impact measurement methodology. These changes include:

- changes resulting from revision 1 of the System of National Accounts 1993 (SNA93), particularly changes in Standard Economic Sector Classifications of Australia (SESCA) and Standard Institutional Sector Classifications of Australia (SISCA);
- an update of frame size benchmarks used for stratification purposes;
- a realignment of Government Finance Statistics units on the Business Register;
- changes in scope to some collections, e.g. the introduction of non-employing businesses in the Quarterly Business Indicator Survey; and
- redesigns of samples to take advantages of efficiencies possible from all of the above changes.

Much of the information from these changes will not be available on survey frames until late 2008 or early 2009. As a result, sub-annual collections will now generally be measuring the statistical impact of all these changes using a parallel run methodology, i.e. for (at least) one quarter, generally the June quarter of 2009, a parallel sample will be selected from a frame stratified on the new basis. Data will be required from more businesses under the parallel run methodology than under the parallel estimation methodology, albeit for fewer reference periods, as data will need to be collected from both the old sample based on ANZSIC93 and the new sample based on ANZSIC06, updated benchmarks, SISCA etc. Two sets of estimates will be produced, one on each basis, with the impact of the changes being the difference.

The new parallel run strategy will be more effective than parallel estimation at being able to capture impacts on the level of estimates due to all the changes, including effects from a substantial sample rotation which will occur as a result of redesigned samples. A weakness of the new strategy is the reduced parallel period, which means any changes to seasonality of estimates will be very difficult to determine. We are exploring an alternative 'modelling' strategy using different data sources such as estimates from the completely enumerated sector of samples and taxation data from Business Activity Statements, and will establish an appropriate methodology to assess changes in seasonality.

Survey areas affected by the change are now in the process of updating their plans to take account of the new strategy, with particular focus on ensuring systems

and processes are ready to cope with the parallel run, as well as developing plans to quality assure the parallel processes and outputs.

For more information please contact Justin Farrow on (02) 6252 5795 or Paul Schubert on (02) 6252 6591.

Release of SEIFA 2006

On March 26, the ABS released the Socio-Economic Indexes for Areas based on the 2006 Census. The ABS has produced SEIFA since 1991 and the production of SEIFA is currently undertaken by the Analytical Services Branch (ASB). With information available at the Census Collection District (CD) level, SEIFA is a popular and unique source of information on relative socio-economic disadvantage.

SEIFA is a suite of four indexes, where each index summarises a slightly different aspect of socio-economic conditions within an area. Each is described below:

- The Index of Relative Socio-economic Disadvantage is a general socio-economic index that summarises a range of information about the economic and social resources of people and households within an area. Unlike the other indexes, this index includes only measures of relative disadvantage;
- The Index of Relative Socio-economic Advantage and Disadvantage also summarises information about the economic and social resources of people and households within an area. It includes both relative advantage and disadvantage measures;
- The Index of Economic Resources focuses on the general level of access to economic resources of people and households within an area; and
- The Index of Education and Occupation focuses on the general level of education and occupation-related skills of people within an area.

As well as constructing the indexes, the ASB has significantly revised the accompanying documentation on how SEIFA can be used and interpreted. This has resulted in two papers which accompany the release of the SEIFA indexes. The Information Paper: An Introduction to Socio-Economic Indexes for Areas (SEIFA) (2039.0) provides users with a non-technical introduction to SEIFA and how it can be used. The Socio-Economic Indexes for Areas (SEIFA) - Technical Paper (ABS cat. no. 2039.0.55.001) provides more technical detail on how SEIFA has been constructed.

The 2006 SEIFA indexes and accompanying documentation are all freely available on the ABS website.

For more information please contact Jonathon Khoo on (02) 6252 5506.

NatStats 08 Conference

Preliminary planning for the ABS-hosted NatStats 08 Conference is underway. The conference, to be held in November 2008, will connect users and producers of

official statistics, and provide an opportunity for participants to discuss strategies for measuring progress in Australian society. The conference focus will be on improving the range and quality of official statistics for the nation.

The main theme for the conference will be "Working together for a better informed and performed Australian Society".

The NatStats 08 Conference will be linked to the global initiative being led by the OECD on Measuring Societal Progress in the 21st Century. As part of this initiative, the OECD will be holding its third major international forum on Measuring the Progress of Societies, in Korea in mid 2009. The OECD World Forums are major events that provide opportunities for collaboration between those who wish to measure, or assess, the progress of their society. The OECD World Forums attract politicians, policy makers and statisticians from around the globe. Previous forums were held in Pisa in 2005 and Istanbul in 2007 and the initiative is gaining significant profile in many parts of the world.

We are interested in hearing your suggestions on topics or case studies for the conference program. If you would like to share your ideas with us, please contact Mark Lound on (02) 6252 6325.

Details of the conference will be included in future editions of Methodological News and posted on the NSS website www.nss.gov.au.

Statistical Clearing House (SCH) Logo

The SCH has recently developed an updated logo. This logo will be used on the NSS website as a link to the SCH and for advertising the SCH, for example on newly developed SCH merchandise such as magnets, notebooks, folders and a series of pamphlets. The previous 'Approval' logo will now only be used for approval of SCH surveys.



Other recent SCH updates include a colourful 'Scoping Stopwatch' tool to assist internal and external clients with survey scoping criteria and the rewording of the SCH Basic Information Template to match the scoping document. The SCH website (along with the NSS site) is currently being updated to be aligned with ABS standards and changes should be noted in due course. Keep an eye out at www.sch.abs.gov.au.

How to Contact Us and Subscriber Emailing List

The Methodological Newsletter features articles and developments in relation to work done within the ABS Methodology and Data Management Division. By its nature, the work of the Division brings it into contact with virtually every other area of the ABS. Because of this, the newsletter is a way of letting all areas of the ABS know of some of the issues we are working on and help information flow. We hope the Methodological Newsletter is useful and we welcome comments.

If you would like to be placed on our electronic mailing list, please contact:

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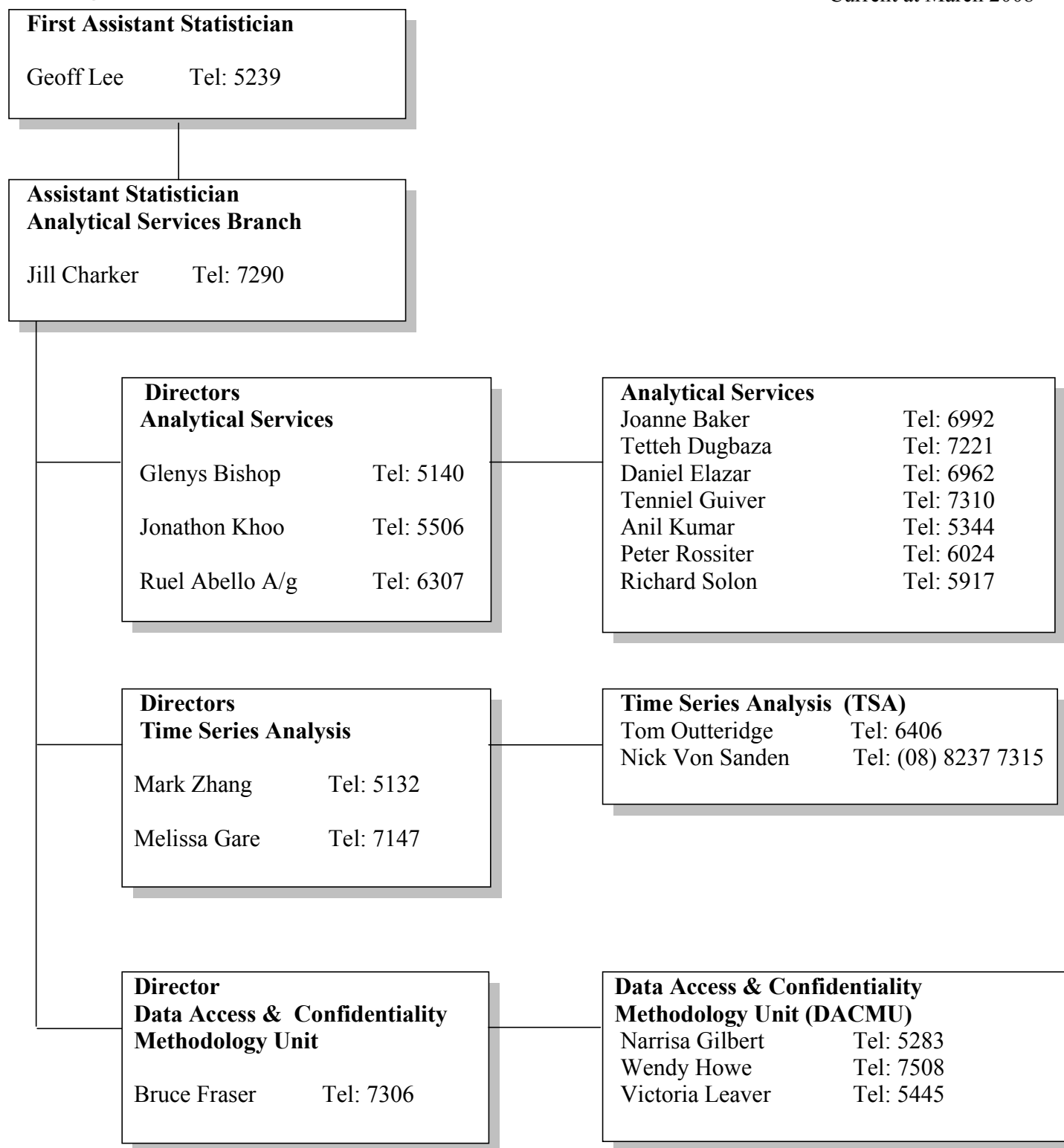
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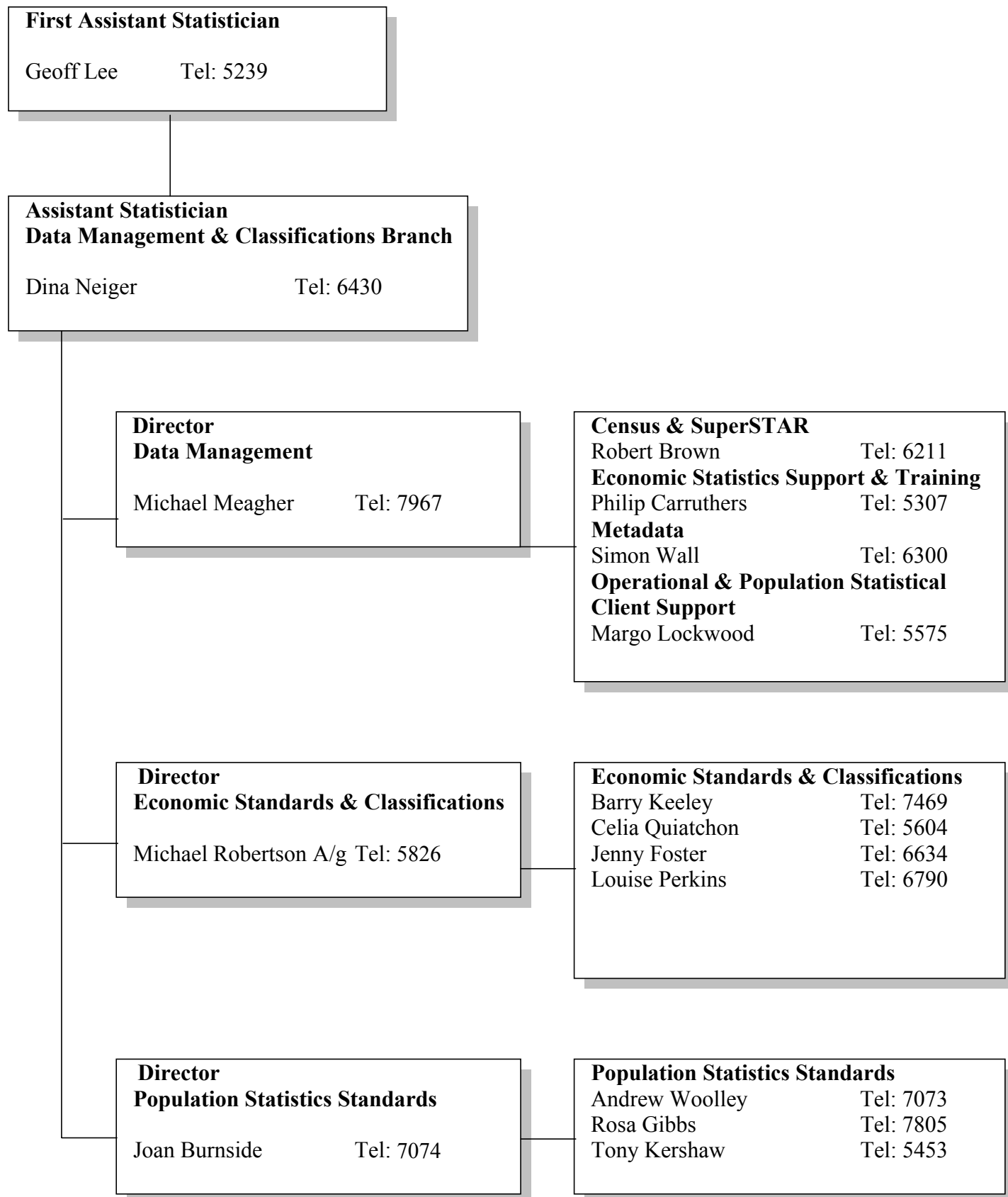
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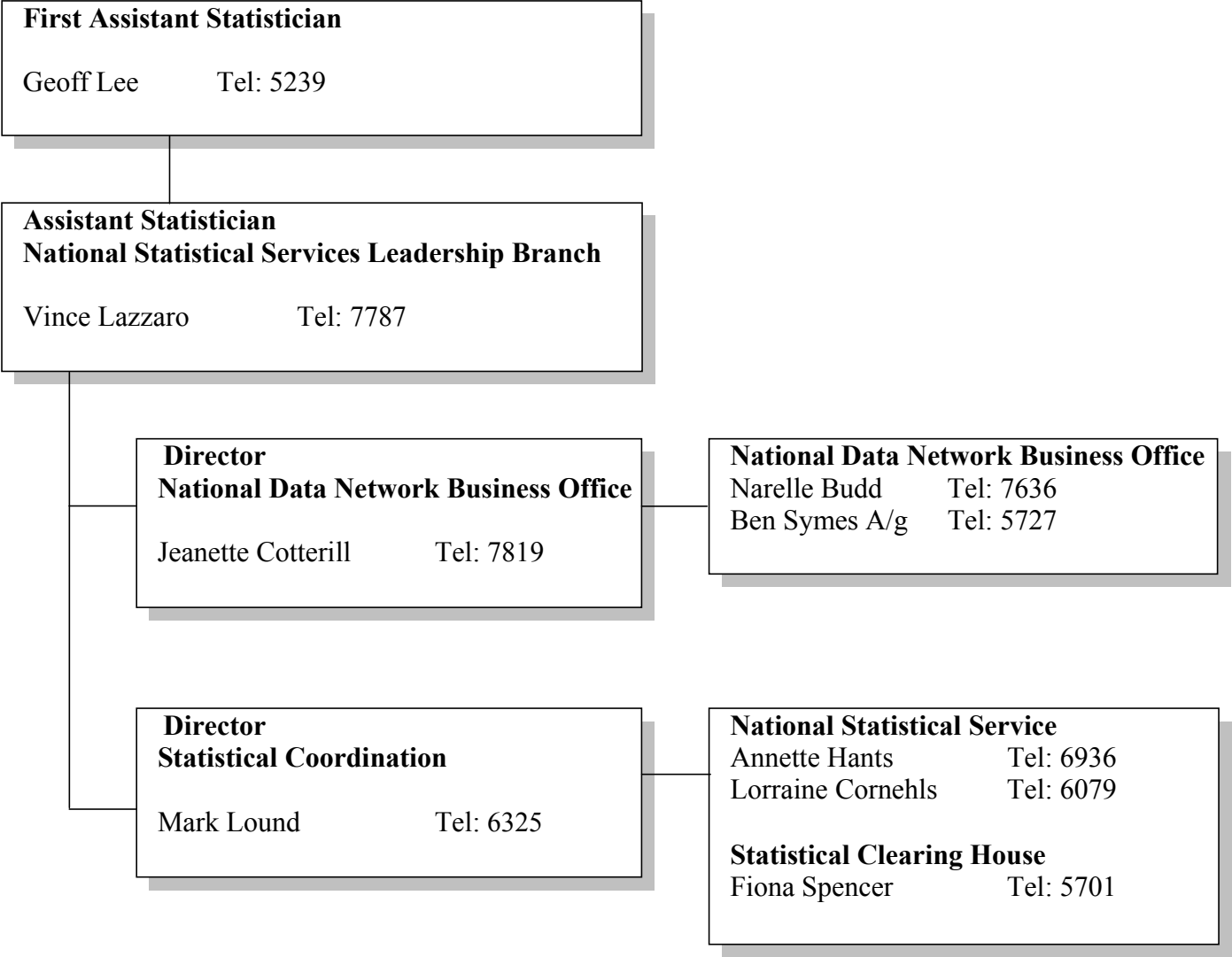
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